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Anterior Pituitary Hormones and the Oestrous Cycle *

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Twenty years have now elapsed since it became established by means of observations on hypophysectomised rats, that the anterior pituitary gland caused the maturation and maintained the functional activity of the primary reproductive organs or gonads (ovary and testis). These observations were largely responsible for the rapid development of a new field of endocrinological research, the complexities of which have given rise to untold confusion in the minds of many practitioners. Largely on this account, the available hormonal preparations have been used indiscriminately and their application to the treatment of physiological infertility has met with little success. This unfortunate position, it is felt, could be reversed, to some extent at least, by a greater understanding of the fundamental work that has been carried out in laboratory animals and it is on this account that I have chosen to discuss these hormonal inter-relationships.

Internal Rhythms of Reproductive Activity

The reproductive organs are unique in that they are in a state of functional activity only at regular periods throughout life. During the complete life-span of most female mammals it is possible to identify three distinct cycles of sexual activity which alternate with periods of complete quiescence. The first of these is a phase, rather than a cycle, which occurs but once during the life span, and is that period between adolescence and senescence which is commonly referred to as the Reproductive Age. During this age all mammals living in the wild state experience every year a rhythm of sexual activity which has been called the Breeding Season. In most species this season occurs in the spring and summer so that the young are reared under the most favourable climatic conditions; but in a few, *e.g.*, the sheep and deer, breeding occurs in the autumn and winter. Under conditions of domestication and captivity the limits of the breeding season tend to become much less clearly demarcated and in some species all semblance of a restricted season is lost, but even in these it is often possible to observe periods of greater fertility which probably correspond to the breeding season of the ancestral form or prototype of the species concerned (Parkes, 1929). There is little doubt that the onset of this cycle of sexual activity is determined by external or exteroceptive factors such as temperature, intensity and duration of daylight, which by means of nervous stimuli, probably by way of the retina, evoke the secretion of gonadotrophic hormones by the anterior pituitary gland (Marshall, 1942).

Within each breeding season there occurs yet a further sexual rhythm called the oestrous cycle. This cycle, it must be clearly understood, refers to a series of physiological and morphological changes taking place within the reproductive tract, *i.e.*, the uterus, cervix and vagina, and is controlled by a simultaneous cycle of activity occurring in the ovaries. As is well known, the ovarian cycle consists in the growth and maturation of one or more Graafian follicles, ovulation and the formation of a corresponding number of corpora lutea and thus, for convenience sake, the cycle is divided into the follicular and luteal phases separated by ovulation. The follicular phase is associated with the growth and maintenance of the female gamete or ovum and with the attainment of sexual receptivity whilst the luteal phase is responsible for the preparation of the reproductive tract for the implantation of the fertilised egg. The corpus luteum is, therefore, a comparatively new development in the evolution of the reproductive organs and is of great significance, in that it is one of the organs by which mammals have become adjusted to the viviparous habit.

Follicular development commences early in life, often at some considerable time before the onset of puberty. Such follicles as are formed in early life, however, rarely undergo the final maturation or what is more commonly known as the "pre-ovulatory swelling" which is pre-requisite to the occurrence of ovulation. It would appear, therefore, that the stimulus for final follicular maturation is not present at this stage of life. In pubertal and early post-pubertal animals it frequently happens that, in spite of follicular maturation having occurred, the mechanism involving ovulation is imperfectly established so that when mating occurs during the first few oestrous cycles the incidence of fertility may be quite low. It is in this way that the condition of adolescent sterility is usually explained.

In the majority of species ovulation occurs during or in very close proximity to the time of sexual "heat" but in the domesticated rabbit and ferret the Graafian follicles will not rupture until mating has occurred or some other intense sexual sensation has been experienced. In the un-mated rabbit and ferret, the follicles having reached maturity proceed to degenerate and are followed by successive waves of maturing follicles which impose a condition of constant oestrus in the reproductive tract of these animals.

Two closely related features of the corpus luteum are (1) the rapidity with which it develops and (2) having maintained functional activity, its capacity to inhibit further follicular maturation and ovulation. Good examples of this are to be found in the rapid growth of follicles following the manual expression of a functional corpus luteum in the cow, and the absence of any extensive follicular activity in most early pregnant animals. The period over which the corpus luteum of different species remains functional is very variable but within members of the same species it is remarkably constant. When mating occurs the corpus luteum remains functional for a much longer period even when, in some animals, the mating does not prove to be a fertile one (pseudo-pregnancy). The mechanism involved in the prolongation of the life of the corpus luteum is still obscure but is probably associated with the nervous stimulation of the cervix at the time of mating.

We should now turn our attention to the oestrous cycle to correlate the changes taking place in the reproductive tract with those occurring in the ovary. During the follicular phase the tract is becoming primed for the sexual reception of the male. The changes occurring in the uterus consist of the increasing tonicity of the muscle layers and of the greater secretory activity of the epithelium lining the lumen. The cervix opens so as to facilitate the passage of spermatozoa on their journey to the Fallopian tubes where fertilisation occurs. Following ovulation and during the luteal phase of the cycle the above changes become reversed. The cervix closes again and the uterine muscles become flaccid but in many species a new phase of endometrial proliferation is initiated, the extent of which depends largely on the period of luteal activity.

The changes in the vagina during the oestrous cycle are of great interest in that they involve (*a*) the rapid multiplication and desquamation of the epithelial cells and (*b*) fluctuation in the leucocyte count. Both these series of changes are most pronounced in the small laboratory rodents, in which it is possible by microscopic examination of vaginal smears to divide the oestrous cycle into four distinct stages, two of which are associated with the follicular phase and two with the luteal phase of the ovarian cycle. In the follicular phase the epithelial cells lining the vaginal lumen undergo rapid division so that a smear would contain very large numbers of these cells together with some polymorphonuclear leucocytes. This stage is known as *Pro-oestrus*. At the time of sexual receptivity or *Oestrus*, which is the second stage, the cells forming the outer layers have become cornified and are sloughed into the lumen. A smear taken at this time, therefore, would consist entirely of these non-nucleated keratinised cells. Leucocytes are not to be found in the smear at full oestrus. The onset of the luteal phase is heralded by a return of the leucocytes in very large numbers which, it is to be assumed, serve to remove the debris of desquamated epithelial cells. This is *Met-oestrus* during which the smear contains large numbers of leucocytes and keratinised epithelial cells. The final stage—*Di-oestrus*—is the resting stage when a smear consists of a small number of nucleated epithelial cells and large numbers of leucocytes. Oestrus can be determined, therefore, in two ways, (1) by the presence of cornified epithelial cells only and (2) by the absence of leucocytes from the smear. It is, however, more usual to distinguish oestrus by the former method, although the importance of the latter cannot be overlooked. It is probable that the high leucocyte content of the vaginal lumen at all stages of the cycle except oestrus itself, is associated with a defensive mechanism to combat bacterial invasion and that the absence of these cells during oestrus is necessary for the survival of the spermatozoa.

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The accurate determination of the four stages of the oestrous cycle of some species is difficult on account of the presence of some cornified epithelial cells at all stages. If, however, the absence of leucocytes in the smear can be used as a criterion of the existence of oestrus, the smear method may have a considerable practical application.

The Role of Pituitary Gland in the Regulation of the Ovarian Cycle

Our knowledge of the physiology of the anterior pituitary gland arose in the first place from observations on animals following the surgical removal of the whole gland. The first recorded account of hypophysectomy was given in 1886 by Horsley who observed that dogs survived without showing any ill-effects for periods up to six months after operation. The early observations dealt largely with the capacity of the gland to maintain life and normal body growth; the results, which were very discordant, have frequently been attributed to failure to remove the gland completely and to the damage caused to the overlying part of the brain, the hypothalamus. Thus the position remained until 1927, when P. E. Smith in New York perfected a technique in the laboratory rat for total hypophysectomy which did not involve injury to the hypothalamus. He showed that the operation was not fatal but it caused the almost immediate cessation of body growth and resulted in atrophy of the gonads (male or female), of the reproductive tract, of the adrenal cortex and of the thyroid glands. He showed also that the regressive changes in these glands could be prevented by the implantation of pituitary tissue and thus established the hormonal nature of their dependency upon the pituitary gland. Finally, Smith observed that no response was elicited in the reproductive tract of rats that had been both hypophysectomised and ovariectomised, and showed in this way that the stimulation evoked in the tract of hypophysectomised rats in response to pituitary gland implantation must have been mediated through the ovary. Thus it was proved that the pituitary gland controlled the functional activity of the primary reproductive organ or gonad and it was on this classical work of Smith that the foundations of our modern knowledge concerning the function of the anterior pituitary gland in reproductive physiology were so carefully laid.

Smith's work has been amply confirmed by many other workers. We know now that the regressive changes in the ovaries and reproductive tract following hypophysectomy lead to absolute sterility. The anterior pituitary gland maintains the activity of all structures that are present in the ovary. Growth is inhibited and regression occurs in all except the most immature and primordial follicles. Hypophysectomy causes regression of the corpus luteum so that when performed in very early pregnancy it will prevent the implantation of the blastocyst and if, by the time of operation, implantation has already occurred, resorption of the pregnancy results. Finally, the interstitial tissue of the ovary becomes atrophic.

There is no reason to doubt that the pituitary gland maintains gonadal function by hormonal means and the hormone or hormones involved in this function, consequently, is termed gonadotrophic. The number of these hormones secreted by the pituitary gland was, in the past, strongly contested but the existence of two of these is now usually accepted. This concept arose from, (*a*) the widely different qualitative responses that could be produced in experimental animals treated with similarly prepared extracts of the pituitary glands of various species, and (*b*) from Aschheim and Zondek's discoveries (1928) of the presence in human urine of gonad-stimulating substances (anterior pituitary-like hormones) which also had different biological activities. These workers and others have shown that following the cessation of gonadal function the human pituitary gland secretes large quantities of a gonadotrophic hormone having only follicle-stimulating activity, a proportion of which is excreted in the urine (Prolan A). At about the same time, the same two German workers observed the presence of another gonadotrophic hormone in the urine of women in early pregnancy. This hormone, which they called Prolan B, produces ovulation and excessive luteinisation of the follicles. This reaction was quickly developed as a means of diagnosing pregnancy in man and is called the A-Z test. We now know that this substance (Prolan B) is secreted not by the pituitary gland but by the placenta and is consequently called chorionic gonadotrophin.

The separation of two gonadotrophic hormones having biological properties similar to those of Aschheim and Zondek's Prolan A and Prolan B, was achieved shortly afterwards by Fevold, Hisaw and Leonard (1931) in America, who called them the F.S.H. and the L.H. This work has been confirmed subsequently and it is generally accepted that these two substances regulate the ovarian cycle. It is necessary, therefore, to postulate the alternate secretion of, or at least some periodic fluctuation in the amount of, one or both hormones secreted by the gland during a complete ovarian cycle.

It very quickly became obvious that to differentiate the biological activities of these two substances the choice of the test animal was extremely important. A comparison of the effects of the two hormones in intact and hypophysectomised rats leaves us in no doubt that in the former animal (*i.e.*, the normal immature rat) the animal's own pituitary gland is activated by the changes taking place in the ovaries and that it secretes its own endogenous gonadotrophin which in turn affects the ovarian response and so masks the intrinsic activity of the injected material. Experiments designed to test the qualitative nature of the two hormones have to be made, therefore, in hypophysectomised test animals.

The administration of F.S.H. to hypophysectomised rats causes only the regeneration of the atrophic follicles, but not to their full maturity, as would be expected. The follicles do not ovulate, but instead pass into atresia or become cystic. The injection of L.H. at the time of hypophysectomy prevents the atrophy in the interstitial cells and when injected several days post-operatively it will restore them to normal size. It also enlarges the cells of the theca (*i.e.*, the wall of the follicle) and converts the atrophic follicles into small bodies having the appearance of miniature corpora lutea. The combined simultaneous administration of these two pituitary factors has been shown to result in the production of much larger ovaries which contained follicles of mature size; luteinisation occurred and in general the ovaries resembled those of a normal sexually mature rat. It is considered that the pre-ovulatory changes in the follicle and ovulation itself are effected by a mixture of both F.S.H. and L.H.—the concentration of the latter probably increases very rapidly before ovulation is achieved.

The preparation of these two hormones from pituitary tissue involves a laborious and expensive chemical procedure which precludes their general use. Fortunately, however, another anterior pituitary-like hormone, resembling the pituitary F.S.H. in its biological activity, is present in very large quantities in the blood of the mare during the second and third months of pregnancy. This substance is commonly known as P.M.S. and is often used to induce follicle-stimulation and, in combination with chorionic gonadotrophin, to cause ovulation. In view of the widespread use of the anterior pituitary-like hormones in the treatment of infertility in the veterinary field it would be justifiable, here, to mention, briefly, their intrinsic biological activities in experimental animals.

The effects which have been produced by the injection of P.M.S. and chorionic gonadotrophin separately into hypophysectomised rats are substantially similar to those induced by pituitary F.S.H. and L.H., respectively. P.M.S. produces, predominantly, follicle stimulation; at the same time, however, it will cause some luteinisation of the follicles, but ovulation is not readily produced. It has been shown, however, that the follicles of the hypophysectomised rat grown to the requisite stage of development by P.M.S., can be ovulated by chorionic gonadotrophin and that the ruptured follicles proceed in an apparently normal manner to develop into corpora lutea. The normality of the induced ovarian cycle is shown by the fact that when the rats are put with the male, mating occurs with fertile results in a large proportion of cases. Fertilised eggs have been recovered from the Fallopian tubes of these rats within four days of mating (Rowlands & Williams, 1943).

Several interesting conclusions can be drawn from the many observations that have been carried out on the induction of ovulation in laboratory animals. To produce the optimal response it is of the greatest importance to study the dosage required for follicle growth and to apply the ovulation-producing stimulus (*i.e.*, pituitary L.H. or chorionic gonadotrophin) at the correct stage in follicular development. It has been shown that in the rat, at least, the follicles grow at a constant rate and the time taken to reach that stage in their development when they will respond to the stimulus of ovulation cannot be accelerated by increasing the growth stimulus. Over-stimulation results either in the production of cystic follicles or in their premature luteinisation. A second interesting feature is the rapidity with which ovulation occurs following the administration of chorionic gonadotrophin. Ovulation, in the rat, as proved by the recovery of eggs from the Fallopian tube, is complete at 16 hours following the subcutaneous injection of chorionic gonadotrophin.

There is ample evidence to show, then, that a normal ovarian cycle can be induced in an animal deprived of its pituitary gland. Nevertheless, it is not possible to state categorically that the cycle, complete with ovulation, was induced solely by means of the two gonadotrophic hormones for the reason that during the period of follicular maturation, oestrogenic hormone which is secreted to cause oestrus in the reproductive tract, may be involved in the furtherance of the events occurring in the ovaries. The above experiments also give us little indication of the mechanism involved in the periodicity of the ovarian cycle. Attention will now have to be directed towards another group of hormones, the sex hormones that are secreted by the ovary to bring about the oestrous cycle, and which have equally important functions in the regulation of ovarian activity.

Sex Hormones and the Regulation of Ovarian and Pituitary Activity

The primary function of the sex hormones is the production of the oestrous cycle in the reproductive tract. This cycle is produced by the consecutive action of two sex hormones which are secreted by the ovary, (*a*) the oestrogenic hormone, Oestradiol, secreted during the follicular phase and (*b*) Progesterone, secreted during the luteal phase of the ovarian cycle.

(*a*) *Oestrogen*

The high content of oestradiol in the follicular fluid, the liquor folliculi, has given rise to the contention that this hormone is secreted by the Graafian follicle during the period when it is under the control of the pituitary F.S.H. and L.H. We have no reason to doubt this but at the same time the early experiments of Parkes (1928) on X-ray sterilisation of the ovary, indicate that the interstitial tissue is a potential source of oestrogen. The picture presented by an X-rayed ovary is one of complete follicular inactivity and of hypertrophy of the interstitial tissue which apparently is capable, in this hyperplastic condition, of causing oestrus; what is of even greater interest, is the fact that the periodicity of the cycle is not significantly disturbed.

The injection of oestrogenic hormone into the ovariectomised animal will cause the full pattern of oestrus in the reproductive tract which has already been described and its capacity to evoke the cellular changes in the vaginal smear of these animals remains in force to-day as the chief biological test for this class of substance.

In addition to its main function of inducing oestrus in the reproductive tract the oestrogenic hormone probably has a no less important role in the regulation of ovarian activity. Experiments carried out in many species of intact animals have shown that following intraperitoneal injection, this hormone increases the mitotic activity of the membrana granulosa of the follicles and stimulates oogenesis in the germinal epithelium. By other methods of administration, oestrogen has been observed to cause luteinisation of follicles and in some species ovulation has been recorded. This luteinising action of oestrogens is not elicited in the ovaries of hypophysectomised rats so that in this respect, at least, oestrogen does not directly stimulate the ovary but rather, it stimulates the anterior pituitary gland to secrete luteinising hormone which, in turn, produces luteinisation in the ovary. A more recent investigation of the action of oestrogens on the ovaries of hypophysectomised rats carried out by Williams (1944) has shown that when a tablet of the hormone is implanted subcutaneously at the time of operation, the atrophic changes normally occurring following the removal of the pituitary gland are arrested and that a slight but significant increase is observed in the size of the follicles. It should be understood, however, as Williams has pointed out, that oestrogens do not stimulate the development of vesicular follicles and are, therefore, not "follicle-stimulating" in the usual sense of the phrase. The present position is, therefore, that while oestrogens are not concerned with any extensive follicular growth, they would seem to be of some importance in the maintenance of the membrana granulosa. As far as I am aware the capacity of oestrogenic hormone to cause ovulation of the mature follicles of the hypophysectomised rat treated with F.S.H. or P.M.S. has not been observed and until this has been investigated we cannot state with absolute certainty that the ovulation which has been reported to have occurred following the administration of oestrogen is a direct action of the hormone on the ovary or whether it is an effect which is mediated through the pituitary gland. Nevertheless, the evidence showing that oestrogen stimulates the secretion of L.H. by the pituitary gland is so strong that, on this basis alone, the intrinsic ovulation-producing capacity of this sex hormone is probably negligible.

One other aspect of the administration of oestrogens, worthy of mention in passing, is the different effects produced in the same species by widely different dosage of the substance. This applies more particularly to the action of the hormone on the pituitary gland. The stimulatory action of the hormone on the secretion of gonadotrophic hormone (L.H.) by the pituitary gland is achieved by the use of small or physiological amounts of oestrogen. Large doses, however, depress the secretion of all pituitary hormones, that is, growth hormone, adreno-trophic, thyro-trophic, gonado-trophic hormones, with the result that in time and with sufficient over-dosage all the symptoms of total hypophysectomy appear. Thus, growth ceases, the skin becomes dry and the hair stands erect and falls out and the genitalia regress to an atrophic condition (Zondek, 1937).

(*b*) *Progesterone*

The action on the reproductive tract of the second sex hormone, progesterone, secreted by the corpus luteum, is to counteract the effects produced by the oestrogenic hormone and, in the mated animal, to prepare the endometrium for the implantation of the developing foetus. Nevertheless, it can be shown experimentally in ovariectomised animals, that the initial sensitisation of the uterus by oestrogen is necessary before the progestational changes in the endometrium can be evoked by progesterone. The tonicity of the uterine musculature decreases rapidly following ovulation and its insensitivity to stimulation can be shown to be, not so much the passive result of the withdrawal of oestrogen from the circulation, but due to a direct action of progesterone. Both these functions of progesterone are associated with the establishment of uterine conditions to facilitate the implantation and retention of the foetus in early pregnancy (see Courrier, 1945).

Recent observations indicate that in a number of species, progesterone acts synergistically with the oestrogenic hormone in the production of oestrus and normal mating behaviour, whilst in others it depresses sexual behaviour and willingness to mate.

We have mentioned previously that follicular maturation and ovulation do not normally occur during the luteal phase of the ovarian cycle. Several observers have reported on the difficulty of inducing ovulation in ovaries in which an active corpus luteum is also present, suggesting that, in the normal luteal phase, progesterone inhibits the pre-ovulatory development and ovulation of the Graafian follicles, by depressing the secretion of the luteinising hormone in the pituitary gland. If this assumption is correct then it is obvious that the amount of L.H. required to maintain the functional activity of the corpus luteum is much less than that required to produce ovulation. There is no direct proof that progesterone affects the secretion of F.S.H. by the pituitary gland.

Hormonal Integration of the Ovarian and Oestrous Cycles

To conclude, I shall try to summarise what has been said of the reciprocal inter-action of the gonadotrophic and ovarian (sex) hormones by which the reproductive cycles are brought about. The great mass of experimental evidence suggests that two gonadotrophic hormones are secreted by the pituitary gland. These are the F.S.H. and the L.H. which maintain the functional activity of the ovary. The former (F.S.H.) is concerned particularly with the development of the antrum of the follicle, that is, it is responsible for the development of vesicular follicles. The latter (L.H.) is claimed by some workers to be associated with the growth of the wall or theca of the follicle and it is widely accepted that it stimulates pre-ovulatory expansion and rupture of the follicle. Both hormones, therefore, play a part in the production of the follicular phase of the ovarian cycle.

During its growth the follicle secretes an oestrogenic hormone (oestradiol) which has as its primary function the establishment of uterine, cervical and vaginal conditions found at oestrus when the female becomes sexually receptive. The pituitary gland has no direct action in the production of these changes in the reproductive tract. It has become recognised, however, that an equally important function of this sex hormone is its capacity to regulate the secretions of the gonadotrophic hormones from the pituitary gland. There is some evidence which suggests that oestrogen in a certain concentration inhibits, or at least suppresses, the secretion of F.S.H. This has the effect of controlling the number of follicles that are ruptured and probably accounts for the sudden regression of partly matured follicles which is commonly observed shortly before the ovulation of the mature follicles. The oestrogenic hormone, on the other hand, stimulates the secretion of L.H. and there is little doubt that the rising tide of this hormone in the blood stream causes the expansion and, ultimately, the rupture of the follicle. In this connection the reported induction of ovulation in some species following the administration of oestrogen (stilboestrol) is of some considerable interest. It is unlikely, however, that this is a direct action of the hormone on the ovary but further work remains to be done on its precise mode of action in this respect.

Ovulation, it has been emphasised, occurs only after the follicle has attained a characteristic physiological condition imposed upon it by the combined action of the two gonadotrophic hormones, and it is of some importance to realise that the chance of regularly inducing this phenomenon is slight if these conditions are not fully satisfied.

Following rupture, the follicle ceases to produce oestrogen so that during the luteal phase of the cycle the concentration of this hormone rapidly diminishes, but as the corpus luteum becomes organised its place is taken by an increasing amount of progesterone which is responsible for the met-oestrous condition of the reproductive tract and, in early pregnancy, for the endometrial development necessary for the implantation of the foetus. The two sex hormones (oestradiol and progesterone) are never secreted by the ovary at the same time; they seem to be mutually antagonistic. From the time of ovulation and subsequently during the remainder of the luteal phase only small amounts of L.H. are secreted to maintain the activity of the corpus luteum. The low rate of L.H. secretion during this period probably ensures against the recurrence of follicular maturation and ovulation and may follow automatically upon the withdrawal of oestrogen. This assumption is difficult to reconcile with the observations which indicate that the corpus luteum, that is, progester-

one, inhibits ovulation by reducing the secretion of L.H. from the pituitary gland. The F.S.H. does not actively participate in the hormonal control of the luteal phase. Progesterone has not been observed to influence the rate of secretion of F.S.H. but the renewal of follicular activity which follows the removal of a functional corpus luteum may suggest that progesterone also depresses F.S.H. secretion. This being so, the gradual withdrawal of progesterone from the blood when the corpus luteum regresses would account for the gradual development of follicles during di-oestrus which are destined to be ovulated at the end of the subsequent follicular phase.

This, then, in general terms, is a concept of the hormonal control of the ovarian and oestrous cycles. It is obvious that there are many gaps in our knowledge of these intricate relationships but considering that until 1927 the pages of reproductive endocrinology were almost blank, very considerable advances have been made and with teams of scientists back at their work with renewed enthusiasm after the break caused by the war there is every reason to hope that the coming years will provide the answer to many an outstanding question.

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Contribution by J. L. Hancock

Mr. J. L. Hancock: As veterinary practitioners I believe you will be anxious to know to what extent the theory of a hormonal control of the reproductive cycle can be translated into practical recommendations for the regulation of sexual activity and the induction of fertility in domestic animals. Having in mind the particular interests of this society I shall confine my remarks to a brief discussion of the oestrous cycle of the bitch and examine the possibility of its regulation by hormonal agents.

It is well known that the bitch normally experiences only two heat periods in the year, her monoestrous cycle being in marked contrast to the polyoestrous cycles of other domestic species, where a number of sexual cycles are observed following one another with no intervening sexually inactive phase.

The oestrous cycle may be studied under the headings which Dr. Rowlands has cited as indicative of the separate phases of the complete cycle, *i.e.*, pro-oestrus, oestrus, metoestrus and anoestrus. The definition of these phases is subject to some variation in interpretation but from a clinical standpoint the most convenient separation of pro-oestrus and oestrus may be reached by accepting the following definitions.

Pro-oestrus is that stage of the cycle which commences with vulval swelling and the appearance of a bloody vaginal discharge, and terminates with the onset of actual acceptance of the dog.

Oestrus is reserved for the period of actual sexual receptivity.

Metoestrus and anoestrus are difficult to separate clinically but metoestrus dates from the termination of the period of acceptance and the changes in the mammary glands and uterus which are characteristic of pseudo-pregnancy are manifestations of the metoestrus phase.

The changes in the vagina which Dr. Rowlands has described as characteristic of the oestrous cycle may be studied by the examination of stained smears. The most prominent features, which I mention briefly, are :—

1. The presence of red blood cells during pro-oestrus. These are very numerous and may be found even during oestrus and beyond into early metoestrus.

2. The absence of leucocytes and the presence of cornified cells during actual oestrus, and

3. The flooding of the smear with leucocytes at the end of the period of acceptance indicating the onset of metoestrus. In our experience from a study of breeding bitches in the stud at Frant this last feature is particularly arresting. According to Evans & Cole the average duration of pro-oestrus and oestrus is approximately 18 days, the two phases occupying about nine days each, but Griffiths & Amoroso have shown that the pro-oestrus phase may be extended if its definition is expanded to cover the period during which red blood corpuscles become evident in the vaginal smear, as these may be observed before the onset of bleeding is apparent. According to the two American authors quoted, the metoestrous changes noted on histological examination of the uterus exactly parallel the changes in the pregnant uterus for the first 14 days. Regressive changes are very evident by the 30th day but reversion to the complete anoestrous state is not complete before the 80th day. Accordingly they give the duration of metoestrus as not less than 80 days and suggest two months as the length of the complete anoestrous phase.

During pro-oestrus the ovaries of the bitch show numerous small and medium-sized follicles and the corpora lutea of the previous cycle are still in evidence. The follicles which are to ovulate are already prominent and at the onset of oestrus proper are in a condition little altered from that which prevailed during pro-oestrus, but the medium-sized follicles are by this time undergoing obvious atresia.

The evidence to hand concerning the time of ovulation indicates that it takes place early in oestrus from the first day of acceptance onward and that the ovulation of successive follicles may be spread over several days. Heat apparently does not terminate until seven days after ovulation and the ova remain in the Fallopian tubes up to the onset of metoestrus.

The ovum of the bitch retains its viability for at least two days and this fact in conjunction with the long viability period of dog sperm extends the period over which fertile matings may take place to several days. In general the first half of the acceptance period would appear to offer the greatest prospect of successful service. At the stud at the Wellcome Veterinary Research Station we have practised mating on the first and third days of acceptance with great success.

In any consideration of the regulation of the canine oestrous cycle, first place must be given to the problem of the induction of fertile oestrus in bitches failing to show heat. It is obvious that the induction of sexual receptivity must be accompanied by the initiation of such ovarian activity as will guarantee ovulation correctly synchronised to the induced heat. Unfortunately, there has been a tendency on the part of the clinician to accept the appearance of normal sexual behaviour as evidence of complete physiological oestrus and the effectiveness of the oestrogens in the induction of manifest heat has guaranteed for them a prominent position in the list of agents which have been applied to the problem.

Dr. Rowlands has already commented upon the paucity of our knowledge of the role of the oestrogenic hormones in the regulation of ovarian activity and has insisted that at the moment we must consider any ovarian effects following oestrogen administration as being related to an action mediated by the pituitary gland. In this case it is obvious that the effects of oestrogen administration will be determined in some degree by the responsiveness of the pituitary gland of the subject. It is probably for this reason that the experimental and clinical reports of the action of oestrogens in the bitch have shown such wide divergence. Thus, while clinical reports frequently indicate that matings at the induced heat are commonly fertile, experimental observations are generally unanimous that the administration of oestrogens, whether natural or synthetic in origin, to bitches in metoestrus or anoestrus, is without any effect upon the ovarian cycle. Pro-oestrous bleeding, cornification of the vagina and acceptance may be regularly induced, but these phenomena are unaccompanied by any ovarian changes and they are not followed by metoestrus but by a relapse into the anoestrous state. In the light of Dr. Rowlands' remarks we can only assume that where fertile oestrus has been observed, ovarian activity was already approaching the level normally associated with oestrous behaviour.

The more rational approach to the problem would seem to rest with a studied application of the gonadotrophic hormones and an attempt to direct their activity to a reproduction of that pattern of follicle development which underlies and governs the morphological and psychological characteristics of oestrus.

It would appear that the clinician possesses adequate agents to secure these ends by utilising the follicle stimulating properties of P.M.S. and the marked luteinising activity of the gonadotrophin of pregnancy urine-chorionic gonadotrophin. However, it must be borne in mind that the use of any gonadotrophin will merely impose a known quantity upon an unknown, in complete ignorance of how much need be administered before the threshold level of ovarian responsiveness is achieved, and Dr. Rowlands has clearly emphasised that the ovarian response is related to both the quantity and quality of the stimulation and to the length of time over which such stimulation is exercised.

Experimental investigations into the hormonal control of ovulation in the bitch have yielded variable results and in particular the dangers of over-stimulation and the subsequent failure of ovulation which Dr. Rowlands stressed have undoubtedly been responsible for the low fertility of matings when heat has been induced by gonadotrophins. Several workers have indicated, however, that the prospects of a successful induction of ovulation may be enhanced by the administration of chorionic gonadotrophin after preliminary stimulation with P.M.S. We believe that if follicle stimulation can be adequately controlled the intervention of endogenous luteinising hormone from the pituitary will dispense with the necessity for its administration and from observations made at Frant in our breeding stud we tend to the opinion that gradual stimulation by divided doses

of P.M.S. spaced at intervals may prove more effective than a single large dose.

Because of the long viability period of both ova and spermatozoa, the long oestrous period of the bitch does not hold such potentialities for infertile matings as it does in the mare, where ovum viability is brief, but nevertheless a termination of oestrus may be sought for aesthetic reasons. The abrupt termination of oestrus in the mare which may be achieved by the intravenous injection of chorionic gonadotrophin, suggests the possibility of a similar approach in the bitch, but in view of the statement made by Evans & Cole that heat normally terminates seven days after ovulation, no such sudden cessation of oestrus should rationally be expected in the canine. In this connection I should like to quote a single experience at Frant where termination of oestrus was sought in a cross-bred bitch which had been in heat for 24 days. Two hundred i.u. of chorionic gonadotrophin were administered intravenously and heat terminated eight days later. The animal whelped and at her next heat period received a further 200 i.u. chorionic gonadotrophin on the eighth day of acceptance and again oestrus terminated eight days later and she again proved to be pregnant.

In view of the successful results obtained in the treatment of ovarian cysts in the cow and mare with chorionic gonadotrophin it seems rational to suggest the application of this agent to the condition as it exists in the bitch and the intravenous route would appear to be the most promising for its administration.

I had no intention of covering the whole field of hormone therapy in canine practice but I would like to call attention to the association of cystic ovaries in old maiden bitches with the presence of a pyometra. Some of you will be familiar with the report published by Lesbouyries & Berthelon on the treatment with gonadotrophin of 35 such cases in the bitch and cat. They found the response to hormone therapy so complete that they instituted the treatment to the complete exclusion of surgical measures. Although the nature of the gonadotrophin was not specified, it is reasonable to assume that a gonadotrophin of predominantly luteinising activity should provide a similar answer and as such chorionic gonadotrophin might receive attention.

Discussion

Dr. Parkes: There was some evidence that an outside influence regulated ovarian function. If one ovary were removed the remaining ovary took on a total activity equal to the original two ovaries, and if an ovary from an adult animal were implanted into an immature animal it would bring that animal to maturity. From these and other observations it had been shown that this outside influence was the pituitary body. The bitch was unique in every phase of her sexual cycle—she bred seldom, there was a long period of anoestrus, and the pre-oestral bleeding was unique among mammals. This latter preceded ovulation and was distinct from menstruation which occurred two or three weeks after ovulation. He asked how Mr. Hancock had calculated the longevity of the ova and sperm in the dog.

Mr. Hancock: It was known that the ova of the bitch was not capable of fertilisation until about 48 hours after ovulation, as the first polar body was not given off until about this time. Sperm viability was probably not less than 96 hours. Griffiths & Amoroso based their observations on the viability of ova and spermatozoa by histological examination of fertilised ova recovered from the tubes of bitches mated at specific times in the cycle, and relating the time of mating to the calculated time of ovulation.

Miss Joshua thanked the speakers for their papers, saying that the scientific nature of the one contribution followed by the practical application of the second speaker had formed a most valuable and interesting paper. She asked if there were any simple technique for obtaining and staining vaginal smears?

Mr. Hancock outlined the technique used at Frant. The vulva was cleansed with spirit and a small metal spatula was inserted into the posterior part of the vagina just anterior to the vestibule. The stains which had been used were 1 per cent. methylene blue after heat fixation, and 10 per cent. Giemsa after fixation in methyl alcohol. Using methylene blue it was more difficult to identify erythrocytes in the smear.

Mr. Pool asked whether Leishman's stain would not be more practical as it contained its own fixative agent.

Miss Joshua: Was there any explanation of the apparent variability of the duration of pro-oestrus in the different breeds? She had found that in Pekes the dog was often accepted after eight days whereas in Chows acceptance was frequently delayed until after the 20th day, and in terriers the period was generally nine to twelve days. In all cases heat terminated approximately eight days after acceptance. Was there an hormonal cause for those bitches showing a brief pro-oestral phase lasting two to four days and then terminating to recur at intervals of about a fortnight? She had noted it in both old and young bitches.

Dr. Rowlands replied that in many adolescent animals the amount of L.H. secreted by the pituitary gland was not sufficient to effect full follicular maturation and oestrus. In these and in older bitches when necessary, he suggested the use of chorionic gonadotrophin to cause ovulation and to induce oestrus, as a substitute for the natural secretion of the pituitary gland.

Miss Uvarov asked how the dose would be estimated.

Mr. Hancock suggested a doseage of 200 units of chorionic gonadotrophin for a bitch weighing 60 lb.

Miss Joshua: In the particular case she had in mind she had, after several recurrences of the condition, given stilboestrol and the bitch came into apparently normal oestrus. Mating was not attempted at that heat but the bitch had since whelped normally and apparently the cycle had readjusted itself.

Mr. Hancock: It was possible that in the case cited follicular development had proceeded to a point where the administration of stilboestrol could have induced ovulation through the mediation of the pituitary gland, but in general such an approach would always carry with it the risk of actually inhibiting ovulation by a depression of the gonadotrophic activity of the pituitary gland. In reply to Miss Joshua's second question about the length of pro-oestrus, Evans & Cole had cited nine days as the mean duration of pro-oestrus in the animals studied by them. Griffiths & Amoroso found the duration of pro-oestrus in greyhound bitches to vary from seven to 22 days. He would say that the variation noted by Miss Joshua might be an individual variation rather than a breed variation.

Miss Joshua: How much was known about the changes in the uterus and the abdomen in the distension of pseudo-pregnancy? In her experience the abdominal distension generally disappeared very suddenly on or about the 49th day with no vaginal discharge or other obvious means why the distensions should have vanished.

Mr. Hancock: Evans & Cole pointed out that the histological appearance of the uterus in the pseudo-pregnant and in the pregnant bitch was identical in the early stages and that retrogression commenced about the 30th day. The degeneration of the epithelial cells of the mucosa at the 70th day in the pseudo-pregnant bitch was identical with that of a puerperal bitch.

Mr. Clarke: What was the effect of the pituitary body upon the growth and descent of the testicles in the young male dog?

Dr. Rowlands: Two gonadotrophin hormones controlled the growth of the testicle, that affecting the spermatic tubules corresponding to F.S.H. and that affecting the interstitial structure corresponding to L.H. The male sex hormone produced by the interstitial cells was responsible for the growth of accessory sex glands so that the use of this material should assist the descent of the testicles.

Mr. Clarke pointed out that P.M.S. and F.S.H. and L.H. had all been used unsuccessfully.

Dr. Parkes: Unsatisfactory treatment with hormones might not be due to inefficiency of the product but to the inability of the tissues to respond. He was interested to hear that stilboestrol was used in misalliance in the bitch.

Miss Brancker: Would it be possible to give stilboestrol implants to produce bitches for use as foster mothers? She appreciated the adverse effects of continued dosage and instanced a miniature pom which was given small doses of stilboestrol commencing three or four days after whelping, and at the twelfth day her bitch puppy developed an enlarged vulva and a slight discharge. She queried the advisability of giving stilboestrol to bitches with a short pro-oestral period; it seemed to stimulate sexual desire, but could it not cause congestion in the Fallopian tubes? Was the use of tablets by mouth in the case of the mismated bitch as satisfactory as the use of stilboestrol by injection? Why was the dose of stilboestrol so small and the action so peculiar in the goat? She also mentioned that she had used Prolan in oil intramuscularly with very satisfactory results in the treatment of pyometra in bitches.

Dr. Rowlands: In reply to the query about stilboestrol implants stimulating the production of milk in the goat, the goat was one of the few species in which full mammary development and lactation could be induced by oestrogenic hormone alone. In most species this hormone stimulated only the duct system of the gland and in these animals full glandular development could be induced with oestrogen and progesterone. He suggested that small doses of P.M.S. would be more satisfactory than stilboestrol to prolong pro-oestrus and to induce sexual desire because they would be less likely to interfere with pituitary function.

Mr. Hancock: The relatively large dosage of stilboestrol which had been recommended as a contraceptive measure in canine practice seemed to have been given on the assumption that contraception would only be achieved by maintaining the uterus in a non-receptive state. He believed that it might be possible to prevent conception by bringing about tubal locking of the ova by the administration of very much smaller doses than were required to prevent their implantation. The length of time required for the ova of the bitch to complate their tubal journey might mitigate against successful locking being achieved by a single injection and a second injection might be advisable three days later.

Dr. Montgomerie: No other side effects had been reported to him. The dosage recommended was 1 mgm. per lb. body weight. There was locking of the tubules and prevention of implantation.

Miss Freak commented on Mr. Hancock's statement that French workers had used L.H. with success in canine pyometra and Miss Brancker's report of success with Prolan A. She thought the question of exact diagnosis should be emphasised. She had regarded pyometra as that condition usually met in the early pseudo-pregnancy period in which the chief symptoms were those of an acute toxaemia, and on ovaro-hysterectomy one found the ovaries containing corpora lutea, the uterus enlarged and containing chocolate-coloured fluid and the endometrium thickened. She would in these cases expect L.H. to be contraindicated. One did meet cases, generally without the presence of toxaemia, in which there was some vulval enlargement, a reddish black very viscid discharge and some attraction for the male. These cases she regarded as being possibly due to cystic ovaries and would expect L.H. or Prolan A to achieve results. She quoted one case in an eight-year-old spaniel bitch in which a pregnancy confirmed by palpation at the 30th day was apparently terminated by acute illness occurring at the 38th to 42nd day (clinically diagnosed as leptospiral jaundice). There was no abortion, the cervix relaxed at the 72nd day, and a tarry, very viscid discharge was shown. On ovaro-hysterectomy the ovaries were found to contain corpora lutea and numerous cysts from pinhead to ¼-in. diameter, and the endometrium was also cystic except for eight well-marked placental areas. Complete foetal resorption had taken place. She queried whether some of one's so-called pyometras following a history of mismating might be the result of foetal deaths at mid-term.

Mr. Hancock: He could offer no explanation for the presence of the cysts but there were recorded cases of foetal resorption after definitely confirmed pregnancy.

Dr. Rowlands: If there were excessive follicular activity in pregnancy it was likely that the level of the oestrogen in the blood would increase; if it rose above a certain threshold it would interfere with pregnancy. During the period when P.M.S. was abundant in the blood of the mare the ovaries were very active and contained numerous follicles which ovulated and formed accessory corpora lutea to maintain the pregnancy. Foetal resorption in the mare, at least, might be explained by these means.

Miss Uvarov rounded off the discussion by expressing the meeting's appreciation of the papers. The Society owed a great debt of gratitude to Dr. Rowlands and Mr. Hancock and all those who had joined in the discussion. She felt that the value of the papers would be enhanced when they were published for she had had many letters from people who regretted that they were unable to attend and it was only by having the opportunity to hear the experts that the practitioner could hope to keep abreast with the enormous development of this branch of endocrinology.

Dr. Rowlands replied on behalf of Mr. Hancock and himself and said how much they had enjoyed the meeting.

POST-GRADUATE SCHOLARSHIPS IN AGRICULTURE

The Ministry of Agriculture and Fisheries and the Department of Agriculture for Scotland propose to award, for the academic year beginning October 1st, 1948, or earlier, a limited number of post-graduate scholarships in Husbandry, Agricultural Economics, Statistics and Agricultural and Dairy Engineering.

Further particulars may be obtained from the Secretary, Ministry of Agriculture and Fisheries, 2, Cambridge Terrace, Regent's Park, London, N.W.1, or the Secretary, Department of Agriculture for Scotland, St. Andrew's House, Edinburgh, 1, according to the country of residence.

* * * * *

The Government is faced with a nice problem in organising the new State industries. Are they to be run in a spirit of sound commercialism or as social services? Take, for instance, the railways. No-one moving around the country can fail to observe how many railway hoardings and carriages are plastered with advertisements of dubious proprietary medicines. . . . As a State concern will they now develop the same social conscience as newspapers? Plainly, isolated action in this field by the Government would be difficult; it might be seen as a manifestation of arbitrary authoritarianism or even as reflecting the Government's vested interest in medical practice. The solution seems to be for Mr. Bevan to place another Bill before Parliament to clean up all forms of patent medicine advertising.—*The Lancet.*

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Weekly Wisdom

All we need fear is fear itself.—Franklin D. Roosevelt.

CLINICAL COMMUNICATION

Strangulated Inguinal Hernia in the Bitch

CHURCHILL FROST, M.R.C.V.S.

Hampton, Middx.

Subject.—Smooth-haired black and tan terrier mongrel bitch aged six years. Weight 25 lb.

History.—A left inguinal swelling which during 1947 had been seen by others and diagnosed as a left reducible inguinal hernia. No surgical interference had been advised. The bitch had been in oestrus during December and was accidentally mated about December 30th. On or about February 9th, 1948, the owner noticed difficulty in moving the left hind leg and an increase in size of the swelling. These symptoms became worse and the bitch was examined on February 12th.

Symptoms.—Temperature 101·2° F. A large tumescent swelling was present in the left inguinal region. The skin was very tense, and beneath, the tissues were blackened towards the centre. Pain was considerable and the leg was carried in an abducted position. The bitch was quiet and subdued, although when normal the temperament was stated to be timid.

Diagnosis.—Strangulated left inguinal hernia.

Remarks.—The swelling and abdominal tension prevented accurate abdominal palpation, and it was not possible to say that the bitch was pregnant. It was thought that pregnancy was likely, and that part of the gravid uterus was the essential hernial content. Surgical interference was considered necessary, and was planned for the next morning when the symptoms were the same except that the swelling had increased in size.

Surgical Plan.—Firstly, median laparotomy was to be performed. The reason for this decision was:—

(1) To find the nature of the organs passing through the inguinal canal, and confirm (or negate) the absence of intestines in the hernia.

(2) To confirm the belief that the bitch was pregnant.

(3) If, as was likely, the hernial content was a foetus in the left uterine cornua, to utilise the laparotomy to perform ovarohysterectomy after dealing with the hernia.

Secondly, to operate over the swelling and above the external opening of the inguinal canal. The exact procedure to be decided by the laparotomy.

Anaesthesia.—Slow intravenous nembutal anaesthesia. Deep surgical anaesthesia was obtained, utilising the anterior cutaneous vein of the right forearm. Approximately 5 grains of nembutal were used.

Surgical Procedure

Preparation.—Instruments and cloths were sterilised by boiling for 30 minutes. The abdomen and inguinal regions were clipped and shaved, and the bitch maintained in the supine position. The surgical field was thoroughly cleansed with methylated spirit. The surgeon "scrubbed up" in the usual way. Cloths were placed exposing the inguinal and median areas.

Method.—Mid-line laparotomy, the incision commencing 1 in. posterior to the umbilicus. Two fingers of the left hand were inserted, and the findings were:—

(1) The bitch was pregnant (*N.B.*, of approximately 45 days' duration). One puppy only was present in the abdomen, and in the right cornua.

(2) No intestines or omentum passed through the inguinal canal.

(3) The polar end of the left uterine cornua could be felt protruding through the internal inguinal ring.

(4) About 1 in. of the left cornua confluent with the uterine bifurcation was also protruding.

The operation to remove the hernial content was now performed. The skin incision released a small quantity of clear slightly brown fluid. The brownish discoloration rendered isolation of the hernial sac difficult, but this was effected by careful blunt dissection. The labial pole of the sac was severed. The sac was opened, and the black turgid uterus containing one puppy was released. This permitted the easy passage into the field of healthy uterus, both polar and vaginal to the diseased part. Ligation on both sides was performed using No. 1 gut. The unopened affected part was then excised. The polar and vaginal ligated ends of the uterus were then passed through the inguinal canal to the abdominal cavity. The inguinal region was now covered with moist swabs. Ovarohysterectomy was now performed through the median laparotomy wound, using No. 1 gut for ligatures and continuous suturing for the vaginal stump. The abdominal incision was closed with interrupted deep and cutaneous No. 3 nylon sutures. The hernial sac was now twisted off, ligated with No. 1 gut and removed. Two nylon sutures were used to cover the external inguinal ring. Three sutures were use

filling "dead space" and the cutaneous wound closed with No. 3 nylon again.

Post-Operative Treatment and Remarks.—50 c.c. 5 per cent. glucose saline were administered subcutaneously at once and the bitch was placed in a warm kennel. The anaesthesia lightened normally. Six hours after the operation the temperature was 100° F. At this time 40,000 units sodium penicillin were administered. Anaesthetic recovery was complete and, late the next day, the bitch took milk voluntarily. The appetite gradually improved during the next three days. On the second day the bitch was walking about normally. The cutaneous sutures were removed on the fifth day. A slight serous discharge began from the caudal end of the inguinal incision on the fourth day, but this gradually disappeared. The bitch was discharged on the seventh day. There are no sequelae to date (March 5th, 1948).

SUMMARY

A strangulated inguinal hernia in the bitch in which the contents were uterus and a 45-day foetus is recorded. The surgical procedure adopted for a successful relief of the condition is also outlined.

ABSTRACTS

[**Improved Intravenous Anaesthesia for Small Animals.** LEONARD, E. P. (1947.) *J. Amer. vet. med. Ass.* **111**. 37-38.]

Whereas local anaesthetics may effectively abolish sensation, general anaesthesia is often preferable in small animals to ensure proper control and asepsis.

Inhalation of ether is safe and especially valuable in hysterotomy but requires skilled administration.

Nembutal and pentothal by intravenous injection are very satisfactory though the therapeutic margin is smaller. Morphine is commonly used as a pre-narcotic but its depressant action, especially on blood pressure and respiration, probably increases the anaesthetic hazard.

Following its use as a respiratory and circulatory stimulant it was found that coramine mixed at the rate of 1 c.c. to each 4 to 8 grs. nembutal increased its therapeutic margin by maintaining good blood pressure and respiration whilst giving effective surgical anaesthesia often with a reduced dose of nembutal. Four case records and some hospital statistics are given and it is suggested that this technique is usefully indicated whenever the anaesthetic or surgical risk is greater than normal.

J. A. L.

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[**Tendoginous Contraction in a Dog** (Control of Haemorrhage following Tenotomy). MCMANUS, R. R. (1947.) *Univ. Penn. Bull. Vet. Ext. Quart.* October. No. 108.]

Following "Z" tenotomy for the partial relief of rachitic contraction of the tendon of the gastrocnemius in a setter dog, the author encountered severe haemorrhage four days later, in spite of previously ligating all blood vessels encountered and severed (ligation by 000 plain catgut). The haemorrhage was steady and severe enough to blanch all visible mucous membranes, though the subject remained bright. The supporting cast was removed and a pressure bandage applied, followed immediately by 500 c.c. 6 per cent. solution of gelatin in normal saline and 500 c.c. of 5 per cent. dextrose. The removal of the intravenous needle occasioned further difficult haemorrhage at the point of puncture and a second pressure bandage was employed.

One hour later no improvement was visible; 125 c.c. of whole blood was then infused.

Two hours later the wound was still steadily oozing blood; 10 c.c. commercial haemostatic were administered without success. Two and a half hours later still, 500 c.c. more 6 per cent. gelatin were infused with 10 c.c. solution calcium borogluconate. Blood slowly oozed through all the dressings for several more days. An unspecified quantity of 10 per cent. solution of sodium citrate was administered on the assumption that excessive damage to blood platelets would enhance coagulability. Within several hours haemorrhage ceased. The limb was recast and recovery was uneventful.

J. A. P.

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"*Trilene Anaesthesia in Small-animal Surgery*": *A Correction.*—It is regretted that in the abstract of this paper appearing in our issue of March 27th, the author's name was erroneously given as Henry, James W., and the journal as *Veterinary Medicine*. This paper was originally published in the first issue (*i.e.*, Vol. 1, No. 1) of the *Journal of the Veterinary Medical Association of Ireland* in January, 1947, the author being Mr. J. W. Heney, M.R.C.V.S., of Dublin. The mis-spelling occurred when his article was reprinted in *Veterinary Medicine*. Since the paper is an extremely useful account of original work carried out by a member of our own Royal College, it is imperative that due acknowledgment should be made.

Questions and Answers

The submission of questions for inclusion in this column will be welcomed: they can relate to any aspect of veterinary work. For purposes of record, each question is numbered, and those submitting questions are required to furnish (not for publication) name and address.

Answers to readers' queries represent exclusively the personal opinions of the writers, and criticism of the replies will be appreciated.

All communications should be addressed to the Editor.

Head Shaking in the Horse

Q. CCXXXIII.—*I was recently consulted about a riding horse which is perfectly quiet and normal except at work when he develops a vigorous shaking of the head, making control difficult and riding uncomfortable and unsafe. Can you suggest any appropriate treatment? What is the cause of the condition?*

A.—Many cases of head shaking in the horse can be traced to irritation of the ears. Flies and midges are a common cause and the old-fashioned straw hat and ear caps for vanners and cart horses save the ears in the summer from the unbearable attentions of these insects. Some horses are more sensitive than others. One case was noted in which the animal was dangerous to ride in heavy rain, on account of head shaking, unless the ears were covered. Head shaking occurs when a night cap is put on carelessly, leaving the forelock bunched up on the poll and tickling the ears. The shaking stops when the forelock is pulled down and tucked under the brow band.

The commonest cause of head shaking, however, is irritation from accumulations of wax in the ears. This can be cleared by swabbing out with one part of ether in seven parts of olive oil. Several applications may be necessary to cleanse the ears adequately and, in horses that are touchy about the ears, fondling and mock attempts at dressing the ears may be required daily for a week or more before a satisfactory swabbing can be carried out. If the ears are very dirty it is advisable to leave the oil and ether used at the first dressing to soak into the wax and soften it for removal at subsequent dressings. On no account should swabs be left in the ears.

It is quite possible that in cases due to ear irritation the habit may persist even though the cause has been removed, but it seems that there are other cases for which no cause can be ascribed and, consequently, no treatment suggested.

. . . . .

Epidemic Diseases of Cats

Q. CCXXXIV.—*Are the epidemic diseases of cats easy to differentiate? What treatment would you recommend for infectious gastro-enteritis?*

A.—Presumably the first part of the question asks for a differential diagnosis between feline distemper and feline enteritis. The outstanding symptoms of the former are: generalised catarrh of mucous membranes, with profuse salivation, and nasal and ocular discharge, much sneezing, oedematous conjunctivitis, diarrhoea, some anorexia and occasional emesis. The temperature ranges about 102 to 103° F. On the other hand, in specific infectious enteritis, the catarrhal, pharyngeal and pulmonary symptoms are absent, but there is much vomiting, great depression, complete anorexia and usually no bowel action. Coma quickly ensues and death often occurs within 24 hours. A more precise differentiation can be made by means of a blood count.

The second part of the question is a little nebulous as it is not known whether the questioner is referring to gastro-enteritis associated with distemper, or to the specific enteritis of the cat in which gastric lesions do not play a part.

As distemper is infectious, the questioner probably is referring to that disease, in which case—apart from the usual hygienic and dietetic treatment—as good a drug as any is sulphamezathine, 3½ gr. twice daily with an initial dose of ½ gr.

Apart from this, the treatment is largely symptomatic.

In the case of infectious enteritis, that disease is often too acute to permit of useful treatment, but where symptoms continue over two or three days, it is worth attempting treatment. Claims have been made of the usefulness of various of the gut sulphonamides, but as sulphonamides possess the character of inducing more or less agranulocytosis, their use is contra-indicated because the disease itself is already an agranulocytosis. Intramuscular injections of concentrated liver extract are useful, and, in addition, measures to combat dehydration should be adopted.

. . . . .

Horns Mobile at the Root

Q. CCXXXV.—*Is there any known explanation for horns which are mobile at the root, in cows?*

A.—No definite explanation is known to the writer. It is suggested it may be due to irregular growth of the horn corium,

(*Concluded at foot of next column*)

IN PARLIAMENT

Minister's Statement on the Medical Profession and the National Health Service

In the House of Commons on Wednesday of last week, Mr. Bevan, Minister of Health, announced proposals designed to remove the doctors' fears that a full-time salaried State medical service might be introduced by regulation and their objections to the £300 basic payment to doctors under the health service scheme. A similar statement was made by Lord Addison in the House of Lords, and both were warmly welcomed by both Houses.

The Minister said: I think that the time has come for me to make a statement to the House about the medical profession and the national health service. I make this statement on behalf both of the Secretary of State for Scotland and myself and of the Government as a whole.

I have been receiving representations from many quarters, and I have studied the resolutions which the Royal College of Physicians and the British Medical Association have sent on to me. I have been trying also to determine for myself what it is that is really and sincerely worrying the doctor.

No doubt as we gain experience we shall find many modifications which would improve the scheme. That is always true of major legislation of this kind. But it seems to me that it is somewhere beyond all this that the key to the doctors' unease and restlessness lies, and that it consists of some instinctive fear—shared by many most well-meaning men and women—that, although the Act does not propose it, and although the Government have themselves denied it, the real objective is a full-time salaried State medical service. It is this fundamental point which I want now to tackle once and for all.

As long ago as 1946, in this House, I said: "Some doctors have expressed the fear that this is merely the beginning of a full-time salaried service. I cannot read into the mind of any future Minister or prophesy what may be done by future Governments, but that is not our intention."

But it seems clear that something more than my spoken assurance is needed, and I am quite willing to do anything to banish this apprehension for good. The Royal College of Physicians has made the useful suggestion, with which the other Royal Colleges associate themselves, that I should make it statutorily clear that a whole-time service will not be brought in by regulation but would require further legislation to make it possible.

My colleagues and I accept that, most cordially. (Cheers.) We propose that it should be clearly impossible to institute a full-time salaried service by regulation alone. It would then need express legislation if it were ever proposed.

I am about to set up an expert legal committee to advise me on the disputed effect of the Act on partnership agreements. I hope to announce details of this committee to-morrow. It seems likely that a short clarifying Bill may be needed as a result of its enquiries. If so I shall take the opportunity—and if not I shall invoke an opportunity specially—to ask Parliament also to clarify our intentions about any full-time salaried service.

There is one further way, I think, in which we can eliminate these apparently widespread fears of a full-time salaried service. By many doctors the proposed fixed element of £300 in remuneration seems itself to be a menacing thing to freedom. I have always conceived it rather as an assurance for the young beginner and for the older practitioner wishing to ease up in old age, and as a peg on which to hang additional assured payments for doubtful areas or other risks—and these are all worthy objects. (Hear, hear.) However, if doctors are afraid of sinister intentions in this, I think these worthy objects can be achieved in another way, and no amendment of the Act is needed for this.

Let all new entrants to practice have the advantages of this assured element of £300 for a period of, say, three years. Then let each decide for himself whether he will forgo it and pass to a system of plain capitation fees, or stay as he is with his fixed £300 plus a lower proportionate rate of capitation. He will be able to do this at any time. Similarly, let any doctor in established practice be able to elect for himself at any time to go on to the system of £300 fixed payment, plus the lower capitation rate, if and when he wants to—for example, in old age—instead of the higher rate with no fixed payment at all.

So now it can rest with the individual doctor to decide the extent to which he prefers the combined system of £300 plus lower capitation, or all capitation—with the exception that beginners will start with three years on the former system.

One other point. I have already given assurances in this House that I do not for one moment intend to interfere with the ordinary rights of doctors to express themselves in speech or writing with absolute freedom. Similarly, I have already given assurances to the profession that the chairman of the tribunal under the Act will be a lawyer of high professional standing appointed by the Lord Chancellor. I need scarcely repeat such assurances now, but —for the removal of any vestige of doubt—I do so.

I trust that what I have said will finally free doctors from any fears that they are to be turned in some way into "salaried Civil servants." I look forward now to a future of active and friendly co-operation with the profession in putting into operation next July a great social measure, which can be made a turning point in the social history of this country and an example to the world. (Cheers.)

NOTES AND NEWS

Diary of Events

April 21st.—Meeting of the Royal Microscopical Society at B.M.A. House, Tavistock Square, W.C.1 (Hastings Hall), 5 for 5.30 p.m.

April 21st.—Meeting of the Section of Comparative Medicine, Royal Society of Medicine, at the Society's House, 1, Wimpole Street, W.1, 5 p.m.

April 21st.—Meeting of the West of Scotland Division, N.V.M.A., Glasgow Veterinary College, 2.15 p.m.

April 22nd.—Meeting of the South-Eastern Division, N.V.M.A., at Maidstone (Royal Star Hotel), 2.30 p.m.

April 28th.—Adjourned Annual General Meeting to be followed by a General Meeting of the Lancashire Division, N.V.M.A., at Manchester (Grand Hotel, Aytoun Street), 2.30 p.m.

April 30th.—Meeting of the Yorkshire Division, N.V.M.A., at York (Royal Station Hotel), 2.30 p.m.

April 30th.—Meeting of the Yorkshire Division, N.V.M.A., at York (Royal Station Hotel), 2.30 p.m.

May 4th.—Animal Management Examination commences at London.

May 4th.—R.C.V.S. Nominations to Council (last date).

May 10th.—Entries due for D.V.S. Examination.

May 14th.—R.C.V.S. Voting Papers issued.

May 18th.—R.C.V.S. Pharmacology, etc., Examination (revised syllabus).

May 25th.—R.C.V.S. Voting Papers to be returned.

June 1st.—R.C.V.S. Annual General Meeting.

June 1st.—V.V.B.F. Annual General Meeting.

June 7th-8th.—R.C.V.S. D.V.S.M. Written Examination.

June 24th-25th.—R.C.V.S. Membership Written Examinations.

Sept. 8th to 15th (inclusive).—N.V.M.A. Congress at Southport.

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R.C.V.S. Council Election, 1948

Since the previous announcement two further nominations have been sent in, from James Carmichael and J. D. Peele.

The complete list of nominations is given below for the benefit of our overseas readers, who will already have received their voting papers:—

Anderson, L. Guy—Aylesbury.
Bosworth, T. J.—Streatley.
Burrow, H.—Streatley.
Carmichael, James—Ongar.
Hare, T.—London.
Mattinson, A. B.—Bamber Bridge.
Peele, J. D.—Durham.
Pugh, L. P.—Sevenoaks.
Townson, W. K.—Peterborough.
Tutt, J. F. D.—Winchester.

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particularly the stratum germinativum. This could result in lack of proper union between horn and corium around the base of the horn at its point of contact with the skin and "horn core."

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Correspondence

"Peritoneal Tympany"

Sir,—In over 35 cases of rumenotomy for reticulitis (actinomycosis present in one case, acute peritonitis in one, and pericarditis in three), I cannot recall a single instance when gas has escaped from the peritoneal cavity. Usually the reverse definitely occurs: air rushes in when the peritoneum is incised.

Yours faithfully,
K. Stuart.

Fairmile,
Oathall Road,
Haywards Heath.
March 18th, 1948.

Re Holiday in Denmark, 1948

VACANCIES

A party of children of British veterinary surgeons is now being organised for a holiday in Denmark in the homes of veterinary surgeons there. Twenty children have booked up to go, and the Danish Veterinary Association has now offered a few more places. If any other members would like to send their children, there is still time if applications are sent *at once* to the General Secretary, N.V.M.A., 36, Gordon Square, W.C.1, and *not later than April 24th*, 1948. The party will be going on August 3rd and returning round about September 3rd, or earlier according to individual wishes. The third-class return fare from London to the Danish port, Esbjerg, is £15 0s. 6d. for children of 12 years and over and £7 10s. 3d. for children of 11 years and under.

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PERSONAL

Appointment.—The appointment in the Colonial Veterinary Service is announced of Mr. J. W. Macaulay, M.R.C.V.S., B.SC. (LOND.), D.V.S.M., formerly Veterinary Officer in Bechuanaland and Kenya, as Senior Veterinary Research Officer, Northern Rhodesia.

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Births.—ADAMS.—On March 30th, 1948, at Rooklands Nursing Home, Bradford, to Mr. and Mrs. A. J. Adams, of 339, Killinghall Road, Bradford—a son.

FOULSTON.—On April 1st, 1948, to Toni (*née* Yeomans), wife of William Foulston, "Ridgeway," Somerset Road, Salisbury—a son, Michael William Swale.

KELSEY.—On Sunday, April 4th, 1948, to Dorothy (née Wearing) wife of Frederick H. Kelsey, M.R.C.V.S., Allestree, Derby, a son—John Frederick.

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Marriages.—MCLAREN—ADDISON.—On April 3rd, 1948, at St John's Cathedral, Oban, Ian McLaren, M.R.C.V.S., only son of Mr. and Mrs. W. A. McLaren, of Harelands, Deeplish, Rochdale, and Joan Violet, only daughter of Mr. and Mrs. J. Addison, Craig Nairn, Oban.

MCTAGGART—JACKSON.—On April 2nd, 1948, at Chapel Allerton Methodist Church, Leeds, Hugh Scott McTaggart, B.A., B.SC., M.R.C.V.S., elder son of Mr. and Mrs. Hugh H. McTaggart, 10, Eden Lane, Edinburgh, 10, to Mary Iselle Jackson, M.C.S.P., younger daughter of Mr. and Mrs. Edmund H. Jackson, 12, Woodbine Terrace, Leeds, 6.

TAYLOR—WILSON.—On March 26th, 1948, at the Church of the Nazerene, Parkhead, Glasgow, Philip Evan Taylor, M.R.C.V.S., of Burry Port, Carmarthenshire, to Miss Jean Wilson, of Dennistoun, Glasgow.

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Golden Wedding.—CATTELL—GUTHRIE.—On April 20th, 1898, at Swansea, Arthur John Cattell, M.R.C.V.S., to Minnie Guthrie, of Bishop House, Brecon, South Wales.

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Camborne Redruth Urban District Council.—Her many friends in the profession will be glad to learn that Mrs. (Dr.) Mary E. Cochrane-Dyet, M.B., CH.B., has been returned at the head of the poll in the Camborne Redruth Urban District Council Election, held on Monday last, April 5th, 1948.

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R.C.V.S. OBITUARY

O'BRIEN, James J., Boherduff, Claremorris, Co. Mayo, Eire. Graduated Glasgow, December 16th, 1909. Died August, 1947.

BARCHAM, Thomas Edward, of Paston, Norfolk. Graduated London 1887. Died April 6th, 1948; aged 81 years.

Mr. Henry Holroyd, M.R.C.V.S., Blackburn

AN APPRECIATION

It was with much regret that we recorded in our issue of April 3rd, the death at the age of 86 of Mr. Henry Holroyd, which occurred on March 26th last, after a period of failing health of some six months. We are glad to publish the following appreciation.

Despite his age, Mr. Holroyd retained his interest in matters concerning the profession and in agriculture generally almost unto the end, and although he had been retired for a number of years, he still attended to special cases right up to the commencement of his last illness. His passing breaks what may be a unique record, for he was one of three generations of his family who had been actively engaged in the firm's practice at the same time for some years. Mr. Holroyd's wife predeceased him in 1930 and John Holroyd was an only son.

Henry Holroyd was a native of Blackburn, and received his general education in that town and in Norfolk. During his early life, he was an artist of no mean ability, and his home was adorned with several of his own black and white sketches and water colours—mostly animal studies. It was his love of nature and fondness of animals which prompted him to embark on a veterinary career, and accordingly he entered the Royal (Dick) Veterinary College in 1880 where as a student he displayed considerable ability; so much so that he gained the two silver medals awarded to the best student in Canine Surgery, 1882-83, and Veterinary Medicine and Surgery, 1880-83. He served his pupilage with the late Sam Buckley, of Blackburn, and soon after graduating in 1883, he commenced practice on his own account, simply putting up his plate. As a result of his ability and perseverance, and despite considerable opposition, he built up a very extensive practice, and later on took his son John into partnership: the practice is now carried on by John and the late Mr. Holroyd's grandson, Harry. One of the proudest moments of his life was in recent years when he was photographed with his son, grandson and great grandson—four generations in the male line.

As was to be expected from one who had spent the greatest part of a long and active life in equine practice, he was a particularly sound judge of a horse; and for many years after the advent of motor cars in the practice, he kept a favourite pony for sentimental reasons. He was fond of oddly coloured horses and his stables were seldom without a piebald or a skewbald. If a horse was not a good driver and capable of a steady ten miles an hour, it had a short life in his stables, but he rarely carried a whip.

The many young assistants and pupils who have been connected with the practice, derived considerable benefit from the fact that he gave freely to them of his great knowledge of horses.

His great hobby was fishing, and nothing pleased him better than to spend a few days angling in the rivers in Ireland.

It was not until 1940, when he had already reached a mature age that I made Mr. Holroyd's acquaintance, but despite this, I got to know him well. Old age is often somewhat intolerant of strangers, but, although of a quiet and reserved nature, he had the facility of making friends of all with whom he came in contact, and I never received anything but the utmost courtesy and kindness at his hands. It can be truly said that he leaves behind many friends and never an enemy, and it was a great privilege to have known him. He was held in high esteem by farmers and stockowners throughout the very extensive area covered by the firm's practice, and by his passing we have lost one of the grand old men of the profession. To his son John and other members of the family, our sincere sympathy is extended in their loss.

E. R. C.

The funeral was held on March 30th, and after a private service at his home, the interment took place in the family vault at Blackburn Cemetery. The service was conducted by the Rev. R. R. Parry, of Huddersfield, a former pastor at the Chapel Street Congregational Church, Blackburn, where the late Mr. Holroyd worshipped. In addition to the private mourners, there were present Messrs. Baxter and Morris, horsekeepers at the Corporation and Railway stables respectively. Members of the profession who attended were Mr. J. Adamson (President, Lancashire Veterinary Association), Major J. Adamson, Major A. B. Mattinson and Mr. J. W. Wilson, Divisional Inspector, Ministry of Agriculture and Fisheries (also representing Mr. E. R. Callender).

Amongst the many floral tributes was one from the Lancashire Veterinary Association, and one from the staff of Messrs. J. & H. Holroyd.

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THE LATE MR. T. E. BARCHAM, M.R.C.V.S.

Mr. Tom Barcham succeeded his father in the practice at Paston near North Walsham in year following his graduation. For the next 32 years he carried on the practice and gained a high reputation over a large area of East Norfolk. He retired from general practice in 1920 but continued in his appointments under the Ministry of Agriculture and the Norfolk County Council until reaching retiring age in 1936. He was a keen member of the Eastern Counties Veterinary Society for which he acted as Hon. Auditor for many years and he was in recent years honoured by the Society in being elected to Hon. membership.

A colleague writes: "Because of his retiring disposition Tom Barcham never became widely known in the veterinary world, but by his gentlemanly bearing, his honesty, and his care and

skill in his professional duties he has done a great deal to enhance the best traditions of the profession to which he was born and for which he lived."

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THE VETERINARY SURGEONS BILL

A Farming Comment

"Farmers are not directly concerned with the internal regulation of the veterinary profession proposed by the Bill introduced into Parliament last week, beyond the possibility it offers of more vets. being trained at universities," observes the *Farmers' Weekly* in its issue of April 9th, and continues: "But we are greatly concerned about the regulation of practice by unqualified persons, and we welcome unreservedly their progressive elimination from the countryside.

"We shall, no doubt, be swamped with stories of the wonderful cures effected by the old 'horse doctor' when everyone else had failed. What we won't hear of is the damage they have done, the times they have failed to diagnose accurately and, perhaps most serious of all, the amount of disease they have carried from farm to farm. All told, we cannot imagine why it has taken so long for this Bill to find its way to Parliament and trust its passage to the Statute Book will be quickly agreed."

. . . . .

The Pharmaceutical Journal observes: "Based upon reports of two Departmental Committees, the Loveday Committee on Veterinary Education and the Chancellor Committee on Veterinary Practice by Unregistered Persons, the Bill aims to put the practice of veterinary surgery on a basis which will enable it to meet the needs of a healthy and well-balanced agriculture which all political parties in recent years have come to recognise as a prime requirement of national policy. . . . We shall watch the passage of the Bill through Parliament with no little interest, particularly in view of the significance which the provisions relating to education and the constitution of the Royal College have for Pharmacy and the Society."

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SCHOLARSHIPS AT FOREIGN UNIVERSITIES 1948-49

Notification has been received of the following scholarships:

The Universities of Cologne and of Münster each offer two scholarships to members of British universities and colleges for study during the academic year 1948-49.

Value: (*a*) *At Cologne.* The scholarships will comprise complete exemption from university fees, and an allowance of RM 200 a month. This amount will cover the cost of accommodation and of reasonable day to day expenses. It is estimated that the cost of accommodation will be RM 50 a month. In the case of a currency alteration, the sum now offered would be adjusted.

(*b*) *At Münster.* The University offers free tuition and an allowance of RM 300 a month.

(*c*) Reichsmarks are *not* at present convertible into sterling.

Duration.—The scholarships are tenable for one complete year. Scholarship holders will be expected to arrive at the beginning of the academic year, which starts at the end of October, and to remain in Germany during the Easter vacation.

The Czechoslovak Ministry of Education offers scholarships to members of British universities and colleges for study at universities or other institutions of higher learning in Czechoslovakia during the academic year 1948-49. The number of scholarships to be awarded has not yet been announced. Eight scholarships were awarded last year.

Value: Each scholarship holder will receive 30,000 crowns (approximately £150 at present). This amount is calculated as being sufficient to cover the cost of food and accommodation for nine months. There is no charge for study at the Czechoslovak Higher Educational Institutions.

Duration.—The scholarships are tenable from October 1st, 1948, to June 30th, 1949. Scholarship grants will be paid in nine monthly instalments on the 1st of each month.

Method of Application.—In respect of all scholarships notified above candidates' applications must be accompanied by:

(*a*) A full statement of the candidate's academic record.
(*b*) The names and addresses of two academic referees.
(*c*) A statement, to be as detailed as possible, of the subject of study contemplated in Czechoslovakia.

Applications should be addressed to:—

The Controller, Education Division, The British Council, 3, Hanover Street, London, W.1, from whom further particulars may be obtained.

The latest date for submitting applications is April 30th, 1948.

MINISTRY OF AGRICULTURE NEWS SERVICE

The Horse Comes Into his Own.—Farming to-day has witnessed a large expansion of tillage and output, mainly as a result of a sudden burst of mechanisation. But the old horse still has his part to play; every yard he travels at work means fuel saved. . . . England, outside the traditional arable regions is still a country of small farms. Taking the country as a whole, a majority are under 100 acres. Few of these can make full effective and economical use of tractors, unless by getting in a contractor at peak periods and for heavy cultivations. Hence the small man must continue to rely largely on the horse.

On large corn growing farms before the war the horse seemed to have gone for good. Now, with the greater diversity of cropping which the times demand, nearly any farm can find useful and necessary work for one or more horses. Economy is the order of the day, particularly in tractor fuel. There are many jobs on farms of all sizes that can be done more economically by horses than by tractors—short journeys, for instance, or light work involving many stoppages, as when bringing home the harvest. The normal pace of a tractor is not much greater than that of a good active horse. Two such horses in a mower, or three in a binder, will ordinarily cut nearly as much as can a tractor, and quite fast enough for the available staff to deal with properly afterwards.

The horse lives off the farm. Except at busy periods, he needs little corn and in most parts of England can run out at grass the year round. Broadly speaking, it is only on paper that he diverts much land to keeping himself which might be used for the production of human food. From the day he is broken in he not only works but "grows into money" until six or seven years old. And as a rule he is not too old at 20. We shall soon be at the beginning of another breeding season and should see that all useful mares are given an opportunity to step up the birth-rate.

. . . . .

Overstocking of Cows.—Recent questions in Parliament have shown that there is considerable public feeling against the continued practice of overstocking. And it should be discontinued, for it may deceive the buyer—a full udder does not indicate soundness or full milking potentialities. But even more important is the fact that it causes the animal unnecessary suffering and is likely to result in injury to the udder tissue. Any method such as sealing the teats with collodion or rubber rings is most objectionable. Injury to the udder or teats is universally recognised as a predisposing cause of mastitis.

These facts need to be made known as widely as possible so that prospective buyers may be alive to the danger of buying overstocked animals.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Swine Fever:

Lincs. (*Lindsey*).—Bridge Farm, Saxilby, Lincoln (April 5th); Woodside, Wispington, Horncastle, Lincoln (April 10th); Bluebell Cottage, Grange Road, Stixwould, Lincs. (April 12th).

Lincs. (*Kesteven*).—Greengate Farm, Thurlby Moor, Bourne, Lincs. (April 10th).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

Correspondents are requested to write as briefly as possible.

THE WORD "BOVINE"

Sir.—The pamphlet dealt with the bovine species only; not with buffalo, horses or sheep, all of which are sometimes included as "cattle." The authors were therefore correct in indicating this by the use of the word "bovine" in the title. Having made this point clear, they were justified in reverting to the less pedantic word "cattle" in their text. I so rarely find myself in complete agreement with the "National" (or indeed any of my professional colleagues) that I hasten on this occasion to assure them of my approval and support.

Yours faithfully,

R. Macgregor.

Kildrummie,
Betchworth,
Surrey.
April 11th, 1948.